

1/9 Bhavnagarwala et al. YOR920030289US1 (TAD) (8728-635)

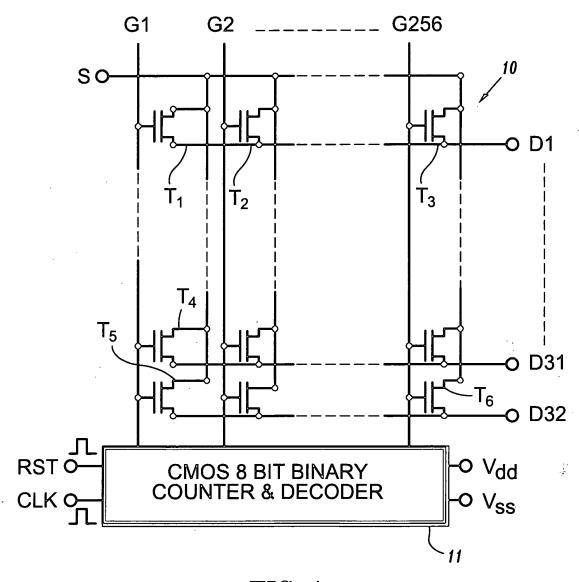
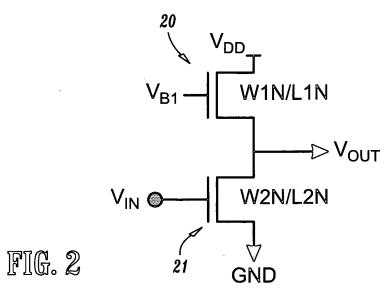
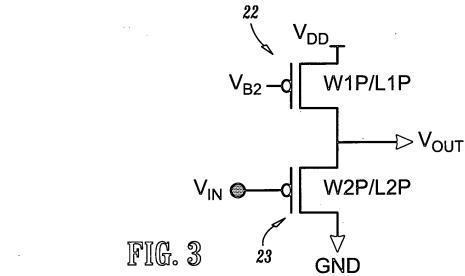
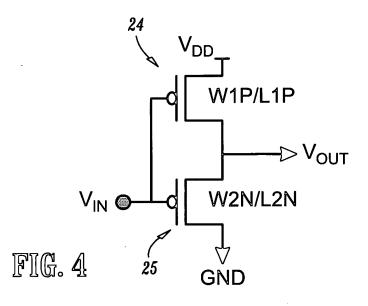


FIG. 1 (PRIOR ART)

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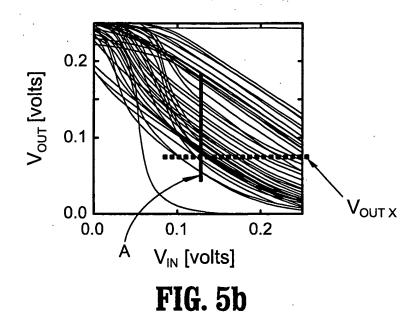


Replacement Sheet

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$$\begin{aligned} V_{in} &= V_{dd} - V_{out} + \boxed{(V_{TN2} - V_{TN1})} + \\ \boxed{\frac{\eta}{\beta} \ln \left| \frac{k_{N1}}{k_{N2}} \right| + \frac{\eta}{\beta} \ln \left| \frac{1 - e^{-\beta(V_{dd} - V_{out})}}{1 - e^{-\beta(V_{out})}} \right|} \\ k_{N1} &= \frac{W_{N1}}{L_{N1}} \mu_{on} C_{ox} \frac{\eta}{\beta^2} k_{N2} = \frac{W_{N2}}{L_{N2}} \mu_{on} C_{ox} \frac{\eta}{\beta^2} \end{aligned}$$

FIG. 5a



Replacement Sheet

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$$\begin{split} V_{in} &= V_{out} - \boxed{(V_{TP2} - V_{TP1})} - \\ \boxed{\frac{\eta}{\beta} \ln \left| \frac{k_{P1}}{k_{P2}} \right|} - \frac{\eta}{\beta} \ln \left| \frac{1 - e^{-\beta(V_{dd} - V_{out})}}{1 - e^{-\beta(V_{out})}} \right|} \\ k_{P1} &= \frac{W_{P1}}{L_{P1}} \mu_{op} C_{ox} \frac{\eta}{\beta^2} k_{P2} = \frac{W_{P2}}{L_{P2}} \mu_{op} C_{ox} \frac{\eta}{\beta^2} \end{split}$$

FIG. 6

$$\begin{split} V_{in} &= \frac{V_{dd}}{2} - \frac{V_{tN1} - |V_{tP1}|}{2} + \\ &\frac{\eta}{2\beta} \ln \left| \frac{k_{P1}}{k_{N1}} \right| + \frac{\eta}{2\beta} \ln \left| \frac{1 - e^{-\beta(V_{dd} - V_{out})}}{1 - e^{-\beta V_{out}}} \right| \\ k_{P1} &= \frac{W_{P1}}{L_{P1}} \mu_{op} \ C_{ox} \ \frac{\eta}{\beta^2} \ k_{N1} = \frac{W_{N1}}{L_{N1}} \mu_{on} \ C_{ox} \ \frac{\eta}{\beta^2} \end{split}$$

FIG. 7a

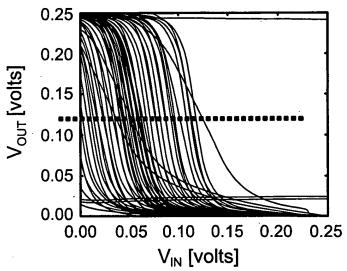
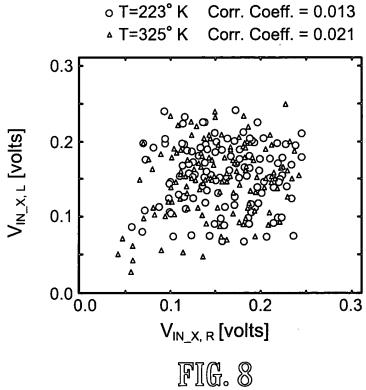


FIG. 7b

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From Measurements, T=325°K, σ V_T =45.4mV

From Model, σ V_T =41.3mV

From Model, σ V_T =43.2mV

14.0

12.0

10.0

8.0

0.0

-0.20

-0.10

0.00

0.10

0.20

 $V_{TN} - V_{TA}$ [volts]

FIG. 9

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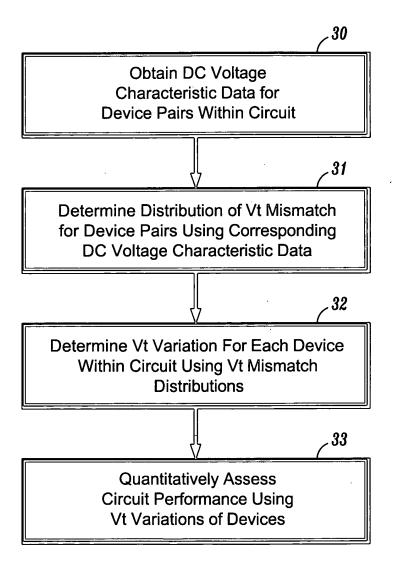
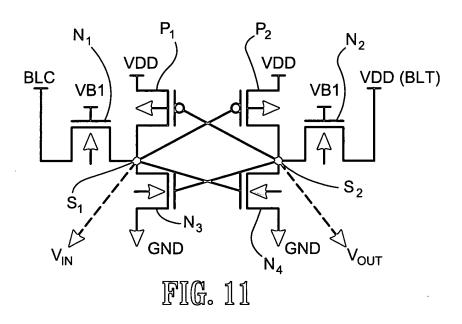
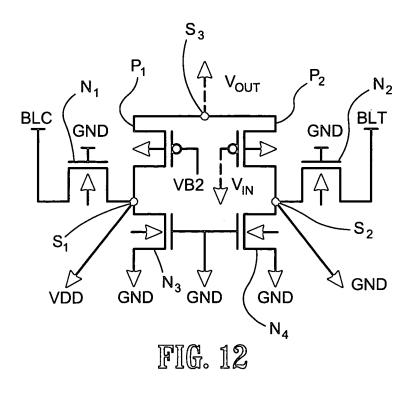


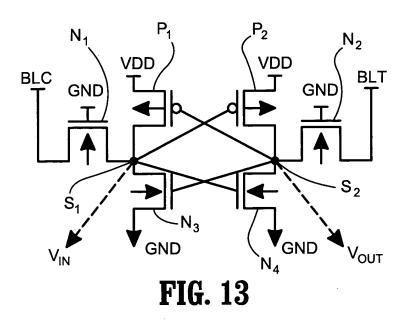
FIG. 10

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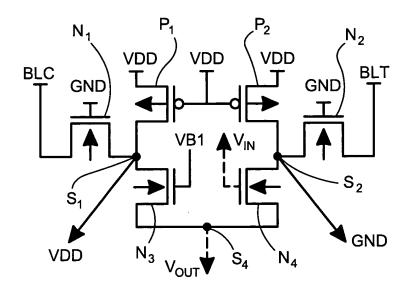


FIG. 14

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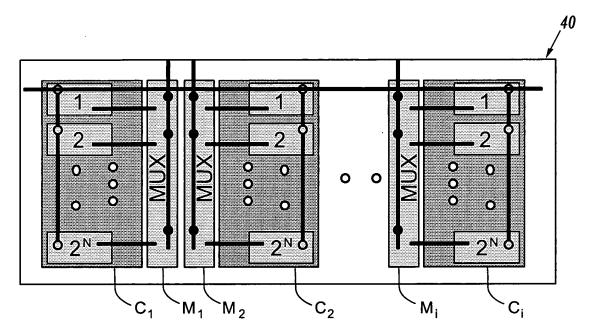


FIG. 15a

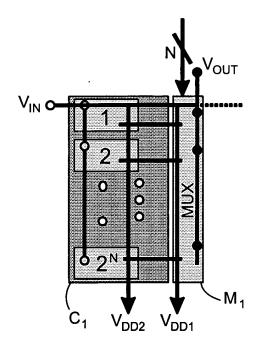


FIG. 15b